RECOVERY PROGRAM DIRECTOR'S UPDATE

March 2004

Status of the Endangered Fishes

The most current estimates of the mean number of wild adult Colorado pikeminnow and humpback chub are shown in Table 1. This table also provides a general overview of efforts to augment or reestablish razorback sucker and bonytail populations in the Upper Colorado River Basin (see Table 2 for 2003 stocking summary). Wild populations of Colorado pikeminnow and humpback chub have been studied since the 1960s, and population dynamics and responses to management actions have been evaluated since the early 1980s. It is anticipated that self-sustaining populations of razorback sucker and bonytail will be reestablished over the next 15 years, during which time population dynamics and responses to management actions will be evaluated. Regions 6 and 2 of the U.S. Fish and Wildlife Service (Service) are collaborating to ensure a coordinated effort to achieve the recovery goals in both the upper (including the San Juan River) and lower basins.

As stated in the recovery goals for the four endangered fishes, the Service considers a reliable population estimate as one that is based on a multiple mark-recapture model. Monitoring must be designed to determine if the demographic criteria of the recovery goals (see Attachment 1) are being met. Accordingly, in the Upper Colorado River Basin, closed-population, multiple mark-recapture estimators are being used to derive population point estimates for Colorado pikeminnow and humpback chub (see section V). Population and demographic data collected through monitoring will be used to track progress toward achieving the recovery goals. The accuracy and precision of each point estimate will be assessed by the Service in cooperation with the Recovery Program and in consultation with investigators developing the point estimates and with qualified statisticians and population ecologists. Such an assessment will occur in 2004. In addition to the demographic criteria, the recovery goals identify site-specific management actions/tasks ("recovery factor criteria") to minimize or remove threats (see Attachment 1). Details of these and other management actions/tasks that contribute to recovery in the upper basin are identified in the Recovery Program's Recovery Implementation Program Recovery Action Plan (RIPRAP).

Table 1.—Summary of species status.

SPECIES	RIVER SYSTEM		
	MIDDLE GREEN	LOWER GREEN	UPPER COLORADO
Colorado pikeminnow	About 3,500 adults (based on 2000 data); report on 2000–2003 estimates due March 2004.	Estimates initiated in 2001; report on 2001–2003 estimates due March 2004.	About 780 adults (based on 2003 data); estimates continuing in 2004.
	SAN JUAN: Estimate of about 20 wild adults based on data collected in the early to mid-1990's; stocking young-of-year fish is currently underway.		
Humpback chub	Yampa Canyon: Population small, about 400 adults, based on model using 1998–2000 data. Effort expanded in 2003 to develop a more precise estimate.	Desolation/Gray Canyon: Estimates for 2001 and 2002 were 1,500 and 1,700 adults, respectively; estimates continued with expanded effort in 2003.	Black Rocks Canyon: About 1,000 adults; estimates continued in 2003. Westwater Canyon: 2,200–4,700 adults based on 3 sampling sites in 1998–2000; effort expanded in 2003. Cataract Canyon: About 150 adults (based on 2003 data); estimates continuing in 2004.
	LOWER COLORADO, GRAND CANYON: 2,000–4,000 adults (not including the mainstem); methods being reviewed to improve estimate.		
Razorback sucker	<100 wild adults; population being augmented through stocking, which is being expanded with excess fish stocked into selected floodplain depressions; stocked fish are returning to spawning bar; monitoring and evaluation of stocked fish in 2003–2004 being accomplished through sampling conducted for other population estimates and nonnative fish control.	Few wild adults; population being augmented through stocking; monitoring and evaluation of stocked fish in 2003–2004 being accomplished through sampling conducted for other population estimates and nonnative fish control.	Few wild adults; population being augmented through stocking; larvae collected in Gunnison River in 2002 indicating reproduction by stocked fish; monitoring and evaluation of stocked fish in 2003–2004 being accomplished through sampling conducted for other population estimates and nonnative fish control.
	SAN JUAN: No estimate of adults is available; stocking 1-year-old-plus fish (greater than 300 mm total length) is currently underway.		
Bonytail	Populations are currently being reintroduced in Colorado, lower Green, middle Green and Yampa rivers; augmentation is being expanded with excess fish stocked into selected floodplain depressions; survival of stocked fish observed; monitoring and evaluation of stocked fish in 2003–2004 being accomplished through sampling conducted for other population estimates and nonnative fish control.		

Status of Recovery Actions by Program Element

I. Instream Flow Identification and Protection

Goal: To protect sufficient instream flows to support self-sustaining populations of the endangered fishes.

Status:

- The final report entitled *Flow Recommendations to Benefit Endangered Fishes in the Colorado and Gunnison Rivers* was signed by the Service on July 29, 2003. The document is available on the Recovery Program participants' website at http://www.r6.fws.gov/crrip/doc/GunnCoflowrec.pdf, and printed, bound copies are available. Reclamation has begun modeling operations of the Aspinall Unit and is developing alternatives to meet the flow recommendations while meeting other authorized purposes. Public scoping meetings for the EIS on Aspinall reoperations were held February 24–26, 2004.

- The Phase II report on development of a model to explore structural and operational measures to increase water temperature in the Gunnison River downstream from Delta will be submitted for peer and Biology Committee review in March 2004.

- The Grand Valley Project canal system in western Colorado was retrofitted with canal checks and automation, which reduced irrigation diversions by 16% or 45,000 acre-feet (af) in 2002 and 12% or 33,000 af in 2003. These reductions surpassed expectations of 28,000 af in average years.

  These improvements are tied to water releases from the Historical Users Pool (HUP) in Green Mountain Reservoir, which the Managing Entities Group oversees. This coordinated process plays a major role in managing water resources to meet human and endangered fish needs. Construction on the Highline Lake pump station is expected to be completed by early summer of 2004. This will complete the last component of Grand Valley Water Management, allowing optimum use of Grand Valley Project water.

- Recognizing the low carryover storage in the Upper Colorado River Basin reservoirs and generally drier than average conditions in 2003, the Service initially set the target flows for the 15-Mile Reach at 250 cfs. However, this target was increased to 450 cfs on August 7, 810 cfs on August 28, and finally to 1,240 cfs on September 18, as hydrologic conditions improved in the basin and it became evident that additional surplus HUP water was available from Green Mountain Reservoir.

  A total of 72,103 af of water was released to support late-summer target flows. This total included 47,526 af from Green Mountain, 20,534 af from Ruedi, and 3,757 af from Williams Fork. Wolford Mountain was drawn down to record low levels in 2002 and, in order to build storage, only 286 af was called for

from Wolford Mountain in 2003 because water was available from other sources.

- The Coordinated Facilities Operations Study (CFOPS) was initiated in 1999 to investigate alternatives for supplying up to an additional average annual 20,000 af of water to the 15-Mile Reach. The Phase II report was finalized in September 2003. Water users are exploring ways to increase participation in the expanded coordinated reservoir operations as recommended in the report.

- The cooperating agency review draft of the Flaming Gorge EIS was released in December 2003. The public review draft will be released in March 2004 and public hearings scheduled in April 2004. The target date for publication of the final EIS is July 2004, and for the Record of Decision, August 2004.

- A final environmental assessment and programmatic biological opinion (EA/PBO) will be completed in FY04 for the *Management Plan for Endangered Fishes in the Yampa River Basin*. The final EA will be completed in March and the PBO is slated for completion by the end of April. Upon completion of the EA/PBO, the U.S. Fish and Wildlife Service will enter into a cooperative agreement with the Colorado River Water Conservation District and the States of Colorado and Wyoming to implement the plan. The plan describes specific recovery actions intended to compensate for the adverse impacts of current and future depletions.

- Recovery Program partners have agreed to fund 5,000 af of a proposed 12,000 acre-foot enlargement of Elkhead Reservoir. The expansion will make water available to augment base flows for endangered fish and to sustain future growth in the Yampa Valley. The Colorado River Water Conservation District plans to submit a 404 permit application to the Corps of Engineers in spring 2004. The Corps will process the application in 90–120 days, during which time an environmental assessment (EA) will be completed. Owen Ayres Associates and its subcontractor, Pioneer Environmental Services, have completed site-specific environmental studies for this purpose.

- The Biology Committee approved the report entitled *Endangered Fish Use and Flow Recommendations for the Duchesne River, Utah* on September 29, 2003. A biological opinion for the Duchesne River based on these flow recommendations is slated for completion in spring 2004.

- The Biology Committee approved the report entitled *Flow Recommendations for the White River* in January 2004. However, because of shortcomings in the study design, additional research may be necessary in the future to develop meaningful flow recommendations.

- The report entitled *Evaluation of Effects of Stage Fluctuations Induced by Hydropower Operations on Overwinter Survival of Young Colorado*

Pikeminnow was revised pursuant to peer and Biology Committee comments and submitted for Biology Committee approval. The Biology Committee is expected to approve the revised report in March 2004.

- The Recovery Program contracted Argonne National Laboratory to develop a strategic plan to prioritize and direct future habitat research and monitoring activities to direct future research toward meeting the recovery goals of the fishes. The final report was completed in September 2003, and program guidance was developed to address research priorities in FY04 and beyond.

- From the Recovery Program's inception in 1988 through December 31, 2003, the Service has consulted on 756 projects with a potential to deplete a total of 1,725,000 af in the Upper Colorado River Basin.

II. Habitat Restoration

Goal: To provide or enhance habitat for the rare fishes through habitat development or management measures such as:
- fish passageways
- screens to prevent fish entrainment into diversion canals
- restoration of floodplain and instream habitats.

Status:

- The fish ladder at the Redlands Diversion Dam on the Gunnison River has been operational since June 1996. To date, the ladder has been used by 53,000 native fishes (versus 7,600 nonnative fishes), including 60 Colorado pikeminnow, six previously-stocked razorback suckers, and one previously-stocked bonytail. Six of the Colorado pikeminnow have used the ladder twice; one has used it three times. Native fishes that were marked and released above the dam dispersed upstream, some as far as 57 river miles to the base of the Hartland Diversion Dam. Installation of a fish screen at Redlands will be completed in FY05 to prevent entrainment of endangered fishes into the diversion canal. Section 7 consultation is underway to provide incidental take coverage for Redlands operations.

- A fish passage structure was constructed at the Grand Valley Irrigation Company Diversion Dam on the Colorado River in January 1998. A fish screen on the canal was completed in March 2002 and operated through early June when drought-year flows became too low to effectively operate the screen. Due to operational problems, the screen was not operated during the 2003 irrigation season. Native fish were retrieved from the canal by the Service in November 2003. Improvements to the fish screen are being made and should be completed by March 2004 in time to allow operation throughout the 2004 irrigation season.
- Construction to restore fish passage at the Price-Stubb Diversion Dam is now scheduled for 2005–2006.

- Construction is underway to restore fish passage and construct a fish screen at the Grand Valley Project Diversion Dam. Passage is scheduled for completion in FY04, and the fish screen is scheduled for completion in FY05.

- Design and installation of a fish screen for the Tusher Wash diversion canal on the Green River can proceed because of the recent decision by the Utah Supreme Court ending a long-standing water-rights dispute. Construction is tentatively scheduled to begin in FY06.

- In fall 2003, the Recovery Program completed the razorback sucker floodplain habitat model to estimate the quantity of habitat needed for recovery, and drafted subbasin and site-specific floodplain management plans to provide clear objectives, costs, and measures of success. Based on the model and these management plans, the Recovery Program has shifted from screening additional floodplain sites for potential restoration/acquisition to focusing on sites already acquired or otherwise available for management.

- Floodplain habitat has been restored at five Bureau of Land Management sites on the Green River, three sites at Ouray National Wildlife Refuge, two sites on the Colorado River near Grand Junction, and two sites on the Gunnison River. The Recovery Program has acquired 1,600 acres of floodplain/wetland habitat along the Green, Colorado, and Gunnison rivers.

- Habitat restoration was completed at the Unaweep Charolais Ranch near Whitewater, Colorado, in October 2003. The site was designed as a razorback sucker nursery habitat for the lower Gunnison River. Site evaluation will be conducted in FY04.

- The Recovery Program obtained an easement on 455 acres of floodplain habitat on Thunder Ranch near Jensen, Utah, in December 2003. Restoration of a 330-acre wetland on this property will provide important nursery habitat in a key location for young razorback suckers and is expected to greatly contribute toward recovery of the species. Installation of manifolds and pipelines to divert selenium-laden waters to the river and breaching of levees is scheduled for FY04. Site evaluation is slated for FY04.

- Information gained from studies on survival of larval razorback sucker and bonytails in the presence of nonnative fishes is being used to determine the amount and type of floodplain habitat needed for recovery. These studies are continuing in FY04. In addition to survival/recruitment studies, research will focus on entrainment of drifting larvae into floodplain habitats by using semi-buoyant beads and stocked, hatchery-produced larvae.

- Adult bonytails stocked into floodplain habitats in 2003 reproduced. These stocking efforts directly increase endangered fish abundance and also help determine the habitat requirements of the species.

III. Nonnative Fishes and Sportfishing

Goal: Minimize the impacts of nonnative fishes and incidental take associated with sport fishing on the endangered fishes.

Status:

- Effective management of riverine populations of problematic nonnative fishes is a high priority of the Recovery Program and one of the most challenging recovery elements.

  As a result of the February 2002 workshop on nonnative fish management, nonnative fish control activities were expanded in FY03 and followed a treatment/control approach. An associated I&E effort included press releases, public meetings, and meetings with resource advisory groups.

  Results of the FY03 nonnative fish management projects were reviewed at a December 2003 workshop and appropriate revisions have been made to the scopes of work for FY04 (including increased effort, placing emphasis on the Yampa River, shifting from treatment/control approach to depletion analysis, and shifting emphasis from channel catfish to smallmouth bass). Tagging of northern pike upstream of the Hayden Bridge will help determine downstream movements into critical habitat and guide decisions to expand control efforts. Evaluation of response of the native fish community to nonnative fish management activities will begin in FY04. I&E efforts will continue.

- Data since 2001 strongly indicate that efforts to manage northern pike in the middle Green River in Utah are having a depletive effect (i.e., 248 removed in 2001, 42 in 2002, and 22 in 2003).

- On February 4, 2004, the Recovery Program adopted a nonnative fish management policy that addresses the process of identifying and implementing nonnative fish management actions needed to recover the endangered fishes. The policy ensures that a more consistent message is included in strategic communication efforts intended to gain agency and public understanding and support for these necessary actions.

IV. Propagation Activities

Goal:
- Produce a sufficient supply of hatchery-reared fish to support research and recovery activities.
- Conserve the genetic diversity present in the wild.

Status:

- Table 2 identifies the species, numbers, and sizes of fish stocked during 2003 into various river reaches to meet requirements of the integrated stocking plan and research needs for the Recovery Program.

- The Recovery Program has moved to a new passive integrated transponder (PIT) tag with a lower frequency for stocked fish beginning in 2004.

Table 2.—Species, numbers, and sizes of fish stocked during FY03 to meet the integrated stocking plan and research needs.

Species	River Section	Number, Season (Hatchery)	Size (inches)
Bonytail	Green (Middle)	3,501, Summer–Fall (Wahweap) > 250,000, Spring (Dexter) 10,000, Spring (Wahweap)	~ 6 larvae juveniles
	Green (Lower)	3,043, Summer–Fall (Wahweap)	~ 6
	Colorado (Colorado)	885, Spring (Mumma)	> 8
	Colorado (Utah)	6,303, Summer–Fall (Wahweap)	~ 6
Razorback sucker	Green (Middle)	8,619, Summer–Fall (Ouray) 345,000, Spring (Ouray/Grand Junction)	~ 10 larvae
	Green (Lower)	2,364, Summer–Fall (Grand Junction)	> 12
	Colorado (Colorado)	5,358, Summer–Fall (Grand Junction)	> 12
Colorado pikeminnow	Colorado (Colorado)	1,000, Summer–Fall (Grand Junction)	> 6
	Gunnison	1,051, Summer–Fall (Grand Junction)	> 6

V. Research, Monitoring, and Data Management

Goal: To support recovery activity, monitor endangered fish status and trends, and maintain Recovery Program data archives.

Status:

- Mark-recapture population estimates are underway to determine progress toward achieving the recovery goals. Monitoring in 2003 was the last year in a 4-year sampling effort to obtain population estimates for Colorado pikeminnow in the middle Green River and an expanded 3-year sampling effort for Colorado pikeminnow in the lower Green River. A draft report on these annual population estimates is due in March 2004. A 3-year sampling effort for annual Colorado pikeminnow population estimates in the Colorado River was initiated in 2003 (initial results continue to show an increase in this population). The current sampling schedule for Colorado pikeminnow populations is sampling for 3 years consecutively followed by 2 years of no sampling to minimize sampling impacts.
- Expanded sampling efforts for humpback chub population estimates began last fall in Yampa, Westwater, and Desolation/Gray canyons. The Black Rocks humpback chub population was also sampled. The first mark-recapture estimate for humpback chub in Cataract Canyon was conducted in fall 2003. The current sampling schedule for humpback chub populations is sampling for 2 years consecutively followed by 2 years of no sampling to minimize

sampling impacts.

- Twenty stocked bonytail were captured in Cataract Canyon as part of the humpback chub monitoring in 2003.

- A workshop is scheduled for later this year to assess the accuracy and precision of each point estimate.

- A computer-interactive key to sucker larvae and early juveniles of the Upper Colorado River Basin was developed and accepted by the Recovery Program to facilitate more accurate identification of specimens by field biologists.

VI. Public Involvement, Information, and Education

Goal: To promote public understanding, appreciation, and support for efforts to recover the endangered fish.

Status:

- News Media: Winter news media stories primarily focused on the proposed expansion of Elkhead Reservoir and the status of nonnative fish management actions. Endangered fish were mentioned in a few stories addressing the 30th anniversary of the Endangered Species Act. The Recovery Program continues to proactively seek news media coverage highlighting research findings and field activities. News clips are distributed routinely to the I&E Committee, interested Management Committee members, and anyone else upon request.

- Implementation of a comprehensive communications strategy for expanded nonnative fish management actions is ongoing and requires active participation and cooperation by the States of Colorado and Utah, the Fish and Wildlife Service and Colorado State University.

- *Program Highlights 2003–2004* was completed in preparation for the partners' trip to Washington, D.C. It will also be distributed to Recovery Program committees. The I&E Committee chose a post-it notepad as this year's educational handout.

- Interpretive Exhibits: Interpretive Designs of Durango, Colorado, is producing six interpretive signs for the Colorado Riverfront Trail in Grand Junction. The signs should be completed and installed this spring. The City of Grand Junction is preparing a letter agreeing to maintain and replace the signs as needed to fulfill its $5,000 commitment toward the project.

- Dinosaur National Monument has established an aquarium at the quarry that features razorback sucker and bonytail.

- The *Swimming Upstream* newsletter was distributed in November 2003.

- The Recovery Program exhibited at the joint annual meeting of the Wyoming Water Association and the Upper Missouri River Water Association in October in Casper, Wyoming, Colorado River Water Users Association's annual meeting in December in Las Vegas, Nevada, the Colorado Water Congress' annual meeting in January in Denver, Colorado, and the Utah Water Users' workshop in March in St. George, Utah.

- The Recovery Program is working with the Colorado Division of Wildlife to expand its species trading cards to include the endangered fishes.

VII. Recovery Program Management

Goal: To ensure effective implementation and coordination of the Recovery Program.

Status:

- The Recovery Program's electronic listserver has 187 subscribers and is one of two key components of the Recovery Program's electronic communication. All Program participants are strongly urged to subscribe. The Recovery Program participants' web site (http://www.r6.fws.gov/crrip/) has detailed Recovery Program information such as upcoming meeting dates and times; meeting agendas and summaries; a bibliography of the Recovery Program library; the RIPRAP; and numerous other Recovery Program documents. The site is regularly updated and expanded.

- The Recovery Program's FY 2004/2005 work plan was approved by the Implementation Committee on September 4, 2003, with a number of "placeholders," primarily for nonnative fish management activities. Those placeholders have been finalized and approved, and the work plan should be printed within a month.

ATTACHMENT 1

SUMMARY OF RECOVERY GOALS FOR COLORADO PIKEMINNOW, HUMPBACK CHUB, RAZORBACK SUCKER, AND BONYTAIL

<table>
<tr><th colspan="2">COLORADO PIKEMINNOW (Green River, Upper Colorado River, and San Juan River Subbasins)</th></tr>
<tr><th>DOWNLISTING</th><th>DELISTING</th></tr>
<tr><td>DEMOGRAPHIC CRITERIA (*self-sustaining with natural recruitment)

Over a 5-year monitoring period:
• Maintain the upper basin metapopulation
• Maintain populations in Green and upper Colorado River subbasins (“no net loss”)
• Green River subbasin population > 2,600 adults*
• Upper Colorado River subbasin population > 700 adults*
• Establish 1,000 age-5+ subadults in San Juan River</td><td>DEMOGRAPHIC CRITERIA (*self-sustaining with natural recruitment)

For 7 years beyond downlisting:
• Maintain the upper basin metapopulation
• Maintain populations in Green and upper Colorado River subbasins (“no net loss”)
• Green River subbasin population > 2,600 adults*
• Upper Colorado River subbasin population > 1,000 adults* OR Upper Colorado River subbasin population > 700 adults* and San Juan River population > 800 adults*</td></tr>
<tr><td>RECOVERY FACTOR CRITERIA

1. Beneficial flow regimes identified, implemented, evaluated, and revised
2. Passage over Redlands and Grand Valley diversions continued
3. Modification of Price-Stubb and Government Highline dams to allow passage initiated
4. Barriers on San Juan River identified, evaluated, and modifications to allow passage initiated
5. Investigations initiated on modifying Aspinall Unit releases to increase water temperatures
6. Measures identified to minimize entrainment of subadults and adults at diversion structures
7. Overutilization reevaluated and, if necessary, actions identified to ensure adequate protection
8. Effects of diseases and parasites reevaluated and, if necessary, actions identified to ensure adequate protection
9. Nonnative fish stocking procedures developed, implemented, evaluated, and revised
10. Control programs for small-bodied nonnative fishes in nursery backwaters developed and implemented to identify necessary control levels
11. Channel catfish control programs developed and implemented to identify necessary control levels
12. Northern pike control programs developed and implemented to identify necessary control levels
13. Mechanisms determined for legal protection of habitat
14. Elements of conservation plans identified
15. Hazardous-materials spills emergency-response plans reviewed and modified as necessary
16. Locations of petroleum pipelines in 100-year floodplain of critical habitat identified and need for emergency shut-off valves assessed
17. Actions identified for remediation of groundwater contamination at Atlas Mills tailings pile
18. Effects of selenium reevaluated and, if necessary, actions identified to reduce deleterious levels</td><td>RECOVERY FACTOR CRITERIA

1. Necessary flow regimes provided
2. Passage over Redlands and Grand Valley diversions continued
3. Modification of Price-Stubb and Government Highline dams to allow passage completed
4. Barriers on San Juan River modified to allow passage
5. Aspinall Unit releases modified, if determined feasible and necessary
6. Devices installed and/or measures implemented at diversion structures to minimize entrainment of subadults and adults
7. Adequate protection from overutilization attained
8. Adequate protection from diseases and parasites attained
9. Nonnative fish stocking procedures finalized and implemented
10. Identified levels of nonnative fish control in nursery backwaters attained
11. Identified levels of channel catfish control attained
12. Identified levels of northern pike control attained
13. Necessary habitat legally protected in perpetuity
14. Conservation plans developed and implemented, and necessary agreements executed
15. Emergency-response plans for hazardous-materials spills implemented
16. Emergency shut-off values installed on problematic petroleum pipelines
17. Groundwater contamination remediated at Atlas Mills tailings pile
18. Deleterious levels of selenium contamination reduced</td></tr>
</table>

HUMPBACK CHUB (Upper Basin and Lower Basin Recovery Units)

DOWNLISTING

DEMOGRAPHIC CRITERIA (*self-sustaining with natural recruitment)

Over a 5-year monitoring period:

- Maintain the six populations ("no net loss"*)
- One core population in upper basin > 2,100 adults*
- One core population in lower basin > 2,100 adults*

RECOVERY FACTOR CRITERIA

Upper Basin Recovery Unit

1. Beneficial flow regimes identified, implemented, evaluated, and revised
2. Overutilization reevaluated and, if necessary, actions identified to ensure adequate protection
3. Effects of diseases and parasites reevaluated and, if necessary, actions identified to ensure adequate protection
4. Nonnative fish stocking procedures developed, implemented, evaluated, and revised
5. Channel catfish control programs developed and implemented to identify necessary control levels
6. Mechanisms determined for legal protection of habitat
7. Elements of conservation plans identified
8. Hazardous-materials spills emergency-response plans reviewed and modified as necessary
9. Measures identified to minimize risk of hazardous-materials spills in Black Rocks and Westwater Canyon from transport of materials along adjacent railway
10. Locations of petroleum pipelines in 100-year floodplain of critical habitat identified and need for emergency shut-off valves assessed

Lower Basin Recovery Unit

1. Life stages and habitats in mainstem identified and relationships between mainstem and Little Colorado River (LCR) determined
2. Beneficial operations of Glen Canyon Dam and flow regimes in LCR identified, implemented, evaluated, and revised
3. Effects and feasibility of TCD for Glen Canyon Dam determined
4. Overutilization reevaluated and, if necessary, actions identified to ensure adequate protection
5. Asian tapeworm control program developed and implemented in LCR to identify necessary control levels
6. Nonnative fish stocking procedures developed, implemented, evaluated, and revised for mainstem and tributaries in Grand Canyon
7. Rainbow trout, channel catfish, black bullhead, and common carp control programs developed and implemented to identify necessary control levels in LCR
8. Brown trout and rainbow trout control programs developed and implemented to identify necessary control levels in mainstem in Grand Canyon
9. Mechanisms determined for legal protection of habitat in mainstem and LCR
10. Elements of conservation plans identified
11. Hazardous-materials spills emergency-response plans reviewed and modified as necessary
12. Measures identified to minimize risk of hazardous-materials spills from transport of materials along U.S. Highway 89 and near the two Cameron bridges spanning the LCR

DELISTING

DEMOGRAPHIC CRITERIA (*self-sustaining with natural recruitment)

For 3 years beyond downlisting:

- Maintain the six populations ("no net loss"*)
- Two core population in upper basin; each > 2,100 adults*
- One core population in lower basin > 2,100 adults*

RECOVERY FACTOR CRITERIA

Upper Basin Recovery Unit

1. Necessary flow regimes provided
2. Adequate protection from overutilization attained
3. Adequate protection from diseases and parasites attained
4. Nonnative fish stocking procedures finalized and implemented
5. Identified levels of channel catfish control attained
6. Necessary habitat legally protected in perpetuity
7. Conservation plans developed and implemented, and necessary agreements executed
8. Flow regimes provided that reflect inter-annual variability in hydrologic conditions to maintain natural proportions of *Gila* species and intergrades
9. Emergency-response plans for hazardous-materials spills implemented
10. Measures finalized and implemented to minimize risk of hazardous-materials spills in Black Rocks and Westwater Canyon from transport of materials along adjacent railway
11. Emergency shut-off values installed on problematic petroleum pipelines

Lower Basin Recovery Unit

1. Appropriate habitats in mainstem provided
2. Necessary flow regimes provided in mainstem and LCR
3. TCD for Glen Canyon Dam implemented, if determined feasible and necessary
4. Adequate protection from overutilization attained
5. Identified levels of Asian tapeworm control in LCR attained
6. Nonnative fish stocking procedures finalized and implemented
7. Identified levels of rainbow trout, channel catfish, black bullhead, and common carp control attained in LCR
8. Identified levels of brown trout and rainbow trout control attained in mainstem in Grand Canyon
9. Necessary habitat legally protected in perpetuity
10. Conservation plans developed and implemented, and necessary agreements executed
11. Emergency-response plans for hazardous-materials spills implemented
12. Measures finalized and implemented to minimize risk of hazardous-materials spills from transport of materials along U.S. Highway 89 and near the two Cameron bridges spanning the LCR

RAZORBACK SUCKER (Upper Basin and Lower Basin Recovery Units)

DOWNLISTING

DEMOGRAPHIC CRITERIA (*self-sustaining with recruitment)

Over a 5-year monitoring period:

- Maintain reestablished populations in Green River subbasin and **EITHER** in upper Colorado River subbasin or in San Juan River subbasin, each > 5,800 adults*
- Maintain established genetic refuge of adults in Lake Mohave
- Maintain two reestablished populations in lower basin, each > 5,800 adults*

RECOVERY FACTOR CRITERIA

Upper Basin Recovery Unit

1. Beneficial flow regimes identified, implemented, evaluated, and revised
2. Passage over Redlands and Grand Valley diversions continued
3. Modification of Price-Stubb and Government Highline dams to allow passage initiated
4. Barriers on San Juan River identified, evaluated, and modifications to allow passage initiated
5. Investigations initiated on modifying Aspinall Unit releases to increase water temperatures
6. Measures identified to minimize entrainment of subadults and adults at diversion structures
7. Appropriate bottomland sites identified and opportunities for land acquisition assessed
8. Overutilization reevaluated and, if necessary, actions identified to ensure adequate protection
9. Effects of diseases and parasites reevaluated and, if necessary, actions identified to ensure adequate protection
10. Nonnative fish stocking procedures developed, implemented, evaluated, and revised
11. Control programs for small-bodied nonnative fishes in backwater and flooded off-channel nursery habitats developed and implemented to identify necessary control levels
12. Channel catfish control programs developed and implemented to identify necessary control levels
13. Northern pike control programs developed and implemented to identify necessary control levels
14. Mechanisms determined for legal protection of habitat
15. Elements of conservation plans identified
16. Levels of hybridization with white sucker reevaluated, effects assessed, and, if necessary, white sucker control programs developed and implemented to identify necessary control levels
17. Hazardous-materials spills emergency-response plans reviewed and modified as necessary
18. Locations of petroleum pipelines in 100-year floodplain of critical habitat identified and need for emergency shut-off valves assessed
19. Actions identified for remediation of groundwater contamination at Atlas Mills tailings pile
20. Effects of selenium reevaluated and, if necessary, actions identified to reduce deleterious levels

Lower Basin Recovery Unit

1. Beneficial flow regimes identified, implemented, evaluated, and revised
2. Measures identified to minimize entrainment of subadults and adults at diversion and/or out-take structures
3. Appropriate riverside sites identified and opportunities for land acquisition assessed
4. Overutilization reevaluated and, if necessary, actions identified to ensure adequate protection
5. Effects of diseases and parasites reevaluated and, if necessary, actions identified to ensure adequate protection
6. Nonnative fish stocking procedures developed, implemented, evaluated, and revised
7. Control programs for nonnative fishes in the mainstem, floodplain, and tributaries developed and implemented to identify necessary control levels
8. Mechanisms determined for legal protection of habitat
9. Elements of conservation plans identified

DELISTING

DEMOGRAPHIC CRITERIA (*self-sustaining with recruitment)

For 3 years beyond downlisting:

- Maintain populations in Green River subbasin and **EITHER** in upper Colorado River subbasin or in San Juan River subbasin, each > 5,800 adults*
- Maintain genetic refuge of adults in Lake Mohave
- Maintain two populations in lower basin, each > 5,800 adults*

RECOVERY FACTOR CRITERIA

Upper Basin Recovery Unit

1. Necessary flow regimes provided
2. Passage over Redlands and Grand Valley diversions continued
3. Modification of Price-Stubb and Government Highline dams to allow passage completed
4. Barriers on San Juan River modified to allow passage
5. Aspinall Unit releases modified, if determined feasible and necessary
6. Devices installed and/or measures implemented at diversion structures to minimize entrainment of subadults and adults
7. Bottomland sites acquired
8. Adequate protection from overutilization attained
9. Adequate protection from diseases and parasites attained
10. Nonnative fish stocking procedures finalized and implemented
11. Identified levels of nonnative fish control in backwaters and flooded off-channel nursery habitats attained
12. Identified levels of channel catfish control attained
13. Identified levels of northern pike control attained
14. Necessary habitat legally protected in perpetuity
15. Conservation plans developed and implemented, and necessary agreements executed
16. Identified levels of white sucker control attained
17. Emergency-response plans for hazardous-materials spills implemented
18. Emergency shut-off values installed on problematic petroleum pipelines
19. Groundwater contamination remediated at Atlas Mills tailings pile
20. Deleterious levels of selenium contamination reduced

Lower Basin Recovery Unit

1. Necessary flow regimes provided
2. Devices installed and/or measures implemented at diversion and/or out-take structures to minimize entrainment of subadults and adults
3. Riverside sites acquired
4. Adequate protection from overutilization attained
5. Adequate protection from diseases and parasites attained
6. Nonnative fish stocking procedures finalized and implemented
7. Identified levels of nonnative fish control in the mainstem, floodplain, and tributaries attained
8. Necessary habitat legally protected in perpetuity
9. Conservation plans developed and implemented, and necessary agreements executed

BONYTAIL (Upper Basin and Lower Basin Recovery Units)

DOWNLISTING

DEMOGRAPHIC CRITERIA (*self-sustaining with recruitment)

Over a 5-year monitoring period:

- Maintain reestablished populations in Green River and upper Colorado River subbasins, each > 4,400 adults*
- Maintain established genetic refuge of adults in lower basin
- Maintain two reestablished populations in lower basin, each > 4,400 adults*

RECOVERY FACTOR CRITERIA

Upper Basin Recovery Unit

1. Beneficial flow regimes identified, implemented, evaluated, and revised
2. Passage over Redlands and Grand Valley diversions continued
3. Modification of Price-Stubb and Government Highline dams to allow passage initiated
4. Investigations initiated on modifying Aspinall Unit releases to increase water temperatures
5. Measures identified to minimize entrainment of subadults and adults at diversion structures
6. Necessary habitats identified
7. Overutilization reevaluated and, if necessary, actions identified to ensure adequate protection
8. Effects of diseases and parasites reevaluated and, if necessary, actions identified to ensure adequate protection
9. Nonnative fish stocking procedures developed, implemented, evaluated, and revised
10. Control programs for small-bodied nonnative fishes in nursery habitats developed and implemented to identify necessary control levels
11. Channel catfish control programs developed and implemented to identify necessary control levels
12. Northern pike control programs developed and implemented to identify necessary control levels
13. Mechanisms determined for legal protection of habitat
14. Elements of conservation plans identified
15. Risk of hybridization evaluated and, if necessary, actions identified to minimize risk
16. Hazardous-materials spills emergency-response plans reviewed and modified as necessary
17. Locations of petroleum pipelines in 100-year floodplain of critical habitat identified and need for emergency shut-off valves assessed
18. Actions identified for remediation of groundwater contamination at Atlas Mills tailings pile

Lower Basin Recovery Unit

1. Beneficial flow regimes identified, implemented, evaluated, and revised
2. Measures identified to minimize entrainment of subadults and adults at diversion and/or out-take structures
3. Necessary habitats identified
4. Overutilization reevaluated and, if necessary, actions identified to ensure adequate protection
5. Effects of diseases and parasites reevaluated and, if necessary, actions identified to ensure adequate protection
6. Nonnative fish stocking procedures developed, implemented, evaluated, and revised
7. Control programs for nonnative fishes in the mainstem, floodplain, and tributaries developed and implemented to identify necessary control levels
8. Mechanisms determined for legal protection of habitat
9. Elements of conservation plans identified
10. Risk of hybridization evaluated and, if necessary, actions identified to minimize risk

DELISTING

DEMOGRAPHIC CRITERIA (*self-sustaining with recruitment)

For 3 years beyond downlisting:

- Maintain populations in Green River and upper Colorado River subbasins, each > 4,400 adults*
- Maintain genetic refuge of adults in lower basin
- Maintain two populations in lower basin, each > 4,400 adults*

RECOVERY FACTOR CRITERIA

Upper Basin Recovery Unit

1. Necessary flow regimes provided
2. Passage over Redlands and Grand Valley diversions continued
3. Modification of Price-Stubb and Government Highline dams to allow passage completed
4. Aspinall Unit releases modified, if determined feasible and necessary
5. Devices installed and/or measures implemented at diversion structures to minimize entrainment of subadults and adults
6. Necessary habitats provided
7. Adequate protection from overutilization attained
8. Adequate protection from diseases and parasites attained
9. Nonnative fish stocking procedures finalized and implemented
10. Identified levels of nonnative fish control in nursery habitats attained
11. Identified levels of channel catfish control attained
12. Identified levels of northern pike control attained
13. Necessary habitat legally protected in perpetuity
14. Conservation plans developed and implemented, and necessary agreements executed
15. Adequate protection from hybridization attained
16. Emergency-response plans for hazardous-materials spills implemented
17. Emergency shut-off values installed on problematic petroleum pipelines
18. Groundwater contamination remediated at Atlas Mills tailings pile

Lower Basin Recovery Unit

1. Necessary flow regimes provided
2. Devices installed and/or measures implemented at diversion and/or out-take structures to minimize entrainment of subadults and adults
3. Necessary habitats provided
4. Adequate protection from overutilization attained
5. Adequate protection from diseases and parasites attained
6. Nonnative fish stocking procedures finalized and implemented
7. Identified levels of nonnative fish control in the mainstem, floodplain, and tributaries attained
8. Necessary habitat legally protected in perpetuity
9. Conservation plans developed and implemented, and necessary agreements executed
10. Adequate protection from hybridization attained